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THE LONDON
TRAMCAR

1861—1952

R. W. KIDNER

With rolling stock notes by
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The tramcar at the peak of its power: near the Elephant and Castle in 1907. The closed-top cars are of the then new E Class, the open ones being original A Class cars

AUTHOR'S NOTE

This is a history of the London tramcar, not of the London tramway. The latter subject, a large and highly intricate one, is only drawn in outline to bring into focus the history of the vehicles themselves. There is a great fascination in the tram, partly because it moves in "determinate grooves," and its forward march in the days of expansion was accompanied by statutory powers and quite considerable engineering works. Also, by its nature, it was local; to a visitor from Edmonton an Ilford tram looked exciting and strange; a Croydon Corporation car on the Embankment helped to make that variety that is the spice of life. To those so interested, London's tramways before 1933 formed a microcosm offering fascinating possibilities for exploration, in which Horns Cross and Hounslow were truly poles apart.

By the same author: The Steam Lorry, 1896-1939; The London Motor Bus, 1896-1949; The First Hundred Road Motors; A Short History of Mechanical Traction & Travel.

IN early Victorian days the road surfaces in London were suffering considerably from the growing amount of traffic, and to save wear many streets were laid with granite blocks where the cart wheels ran, sometimes stepped to ensure that the wheels did not stray. These were called tramways : some were of great length ; that in the Commercial Road, laid in 1829, extended for two miles. There was a proposal to lay a granite tramway for steam-carriages from London to Holyhead. By 1856 experiments with cast-iron tram-plates were being carried out by the London highway authorities, the Commissioners of Sewers. At the same time, the first moves were being made to provide London with an underground railway system.

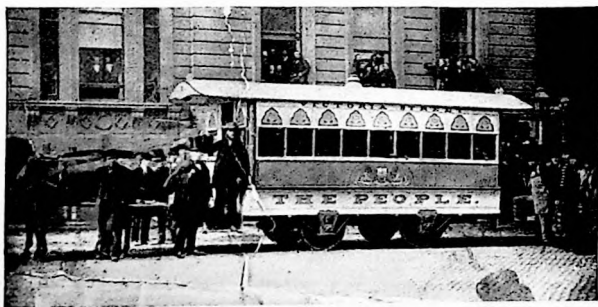
This was the situation when reports began to circulate of the success of street railways in New York and Paris. In 1858 the London Omnibus Tramway Company sought unsuccessfully to construct a street railway from Bayswater to Farringdon Street. In 1859 W. J. Curtis, who had inaugurated a line in Liverpool on which cars with flanged wheels and ordinary flat-tyred omnibuses ran together, was given permission to construct a similar line in London, in Islington.

That this was done is vouched for in a letter from its author, W. J. Curtis, to *The Royal Society of Arts Journal* in October 1860 : "The rails are on the ground," said his letter, "and within a very brief period the public will have an opportunity of judging the value of the system." But reports in *The Builder* at the time make it almost certain that the line never opened ; it is pertinent to recall the words of Sir Benjamin Hall, Chief Commissioner of Public Works, speaking in February 1858 to a deputation in regard to an application to Parliament for tramway powers : "I have maturely considered the plan, and of all the monstrous propositions which have ever been made or presented to Parliament, this is the worst . . . I shall give the measure my most determined opposition."

Curtis referred to the flanged-wheel vehicles upon his Liverpool line as "omnibuses." In fact the word tram still applied only to such things as colliery tubs.

The tram as we know it was a direct importation from America, brought to our shores by George Francis Train. This flamboyant character had studied street tramways in New York and Paris, and laid a line at Birkenhead. He received grudging permission to lay three short lines in London, and these were opened as follows: from Marble Arch along the Bayswater Road to Notting Hill Gate on 23 March 1861; from Broad Sanctuary up Victoria Street to the Vauxhall Bridge Road on 15 April 1861; and from the south end of Westminster Bridge to Kennington a few weeks later.

It is recorded that George Cruikshank was the first man to ride on a London tramcar, at the opening of the Bayswater line, and that Charles Dickens and Thackeray were also present. The occasion was marked by a banquet, to which President Lincoln and the Duke of Cambridge were invited, although they did not attend. The opening of the Victoria Street line was inaugurated by an "American Breakfast" at the Westminster Palace Hotel. Train



A tram on Train's Victoria Street line, 1861

intended this line to continue over Westminster Bridge (already laid with granite trams) to join the Kennington line, but the thought of these new-fangled contraptions actually running past the seat of Government could not be tolerated.

The tramcars, which were, of course, hauled by horses, were built upon the American pattern, with some of the



A North Metropolitan horse-car at Clapton in 1879

opulent vulgarity of early Pullman cars. That on the Victoria Street line, illustrated here, was built by the Railway Carriage & Wagon Co., of Birmingham. Contemporary reports refer to it as a 60-seater, though its length cannot have much exceeded twenty feet. It is more likely that it seated only twenty. The innovation, alas, was short lived. Two things led to Train's defeat: he was an American, and his lines were dubbed "Yankee Railroads" to their detriment in the eyes of a very jingoistic public; further, the iron step-rail which he used projected above the roadway, and quickly earned the hostility of the other highway users. The Bayswater line was ordered to be closed and removed by 4 October 1861. Wrote *The Engineer*: "Train, with a certain amount of bravado, put his rails down directly under the noses of the wealthy residents of Bayswater, mostly 'carriage people,' who even if they had no prejudice whatever against trams, had little occasion to use them, still less in the direction of Notting Hill." It will thus be seen that the association with kippers and stale beer which has been the London tram's lot for nearly a century was present at its birth. The journal was good enough to add, "in its extended trial nobody has been killed". The removal of the Victoria Street line was ordered by mid-March 1862, and a conviction against Train

in respect of the third line was obtained at the Surrey Assizes in April 1862. It is of interest that one of Train's associates was J. Clifton Robinson, later Managing Director of the London United Tramways.

II

A Fresh Start

IT must not be supposed that public opinion was solidly against tramways. Schemes continued to be hatched, and in 1865 *The Builder*, discussing plans for new lines, wrote that they would be competitive with the London General Omnibus Company (whose application for tramway powers had failed in 1858). This would constitute a strong recommendation to Londoners, "who desire to supersede, by an English Company, the French association, which at present overrides the citizens with their bad draughty omnibuses and their broken promises". It was clear that London, whose population was growing rapidly and pushing up suburbs with great vigour, could not remain tramless for long. During 1870 three lines were opened, from Westminster Bridge to Kennington Gate, from Kennington Gate to Brixton Rise, and from Whitechapel to Bow. There followed the line from Vauxhall Bridge to Blackheath Hill, which employed 25 cars doing seven trips per day, providing a ten-minute service from 8 a.m. to 10 p.m. By the end of 1871, 441 cars daily were passing St. George's Circus. The tramway era had begun in earnest.

Since Train's ill-fated venture many different kinds of tramway rail had been suggested, and some tried. These new London lines employed the groove-rail, which was held to be the least obnoxious to horse-traffic. The gauge was 4 ft. 8½ in. and on double-track sections there was a 4 ft. way. The cars used differed little from those of George Train: they weighed on an average 2½ tons empty, and ran on 30-in. wheels. Many were built in the States. John Stephenson & Co., of New York, supplied 221 cars between 1879 and 1883 to the London Tramways Co., and 75 to the North Metropolitan. At this point, it may be convenient to consider rapidly the growth of the tramway networks up to the

time when the arrival of the electric tram brought about a great change in their fortunes.

The horse-tramway systems of London operated 42 miles of line in 1873, 61 in 1876, and 130 in 1891. In 1891 they carried 200 million passengers, compared with 327 million on the railways and 200 million on the buses. The North Metropolitan Tramways formed the most important single undertaking, with almost 42 miles of route open for traffic in 1891. Its original line of 1870 from Whitechapel to Bow was soon extended into West Ham; it also ran lines in East Ham and Leyton. It covered the whole north and east sector of London from the foot of Highgate Hill to the Docks, a system that required a fleet of 342 cars and 3,346 horses in 1890. The North London (originally North London Suburban) Company was an unsuccessful concern which operated from 1881 until it was taken over by the



The horse-tram which ran on the isolated Kew—Richmond line, abandoned in 1912

North Metropolitan in 1891; its lines ran from Stamford Hill through Tottenham to Edmonton and from Finsbury Park to Wood Green. The North Metropolitan's neighbour on the west was a smaller system running from Tottenham Court Road and Gray's Inn Road to Hampstead Heath and the Archway Tavern, called the London Street Tramways; the first portion was opened in 1871, and it had 13½ miles open in 1891, with 124 cars and 1,127 horses.

The remaining tramways north of the Thames were small and isolated ; the legislation of the time made it possible for local authorities to veto the laying of tramways, and those of the more prosperous districts, like the City, Westminster, St. Marylebone, and Kensington, always did. A cable tramway was opened in 1884 from the Archway Tavern to Southwood Lane, at the top of Highgate Hill. It was closed in 1892 after an accident due to a broken cable and reopened in 1897. The Lea Bridge, Leyton and Walthamstow line was $2\frac{1}{2}$ miles long, single track ; the Harrow Road and Paddington was under 2 miles long ; the West Metropolitan ran from Shepherd's Bush and Hammer-smith to Acton and Kew Bridge, with an isolated section from the south side of Kew Bridge to Richmond.

South of the river the most important system was the London Tramways, formed in 1870 by the amalgamation of the Metropolitan Street Tramway Co. (Westminster Bridge to Kennington, Brixton, and Clapham) and the Pimlico, Peckham, & Greenwich Tramway Co., which

*A Croydon
Tramways
single-horse
car at the
Red Deer
in 1885*



between them had obtained powers in 1869 for tramways in nearly all the principal streets on the south side. By 1890 there were $21\frac{3}{4}$ miles open, extending from the south ends of Blackfriars, Westminster and Vauxhall Bridges to Tooting, Streatham, and Greenwich ; there was also an isolated section north of Vauxhall Bridge as far as Victoria Station. The company owned 287 cars and 3,211 horses, and also operated 37 omnibuses across the bridges it was forbidden to lay its rails on. The section from Kennington Gate to Streatham was converted to cable working in 1893.

To its west was the South London Tramway Co., with routes from London Bridge Station, the Elephant and Castle, and St. Thomas's Hospital to Clapham and Wandsworth, mostly opened in 1884. It operated almost 13 miles, with 86 cars; it also owned 16 omnibuses. The London Southern was a pretentious name for 5 miles of line between Vauxhall, Brixton, Camberwell Green, and West Norwood. The London, Camberwell and Dulwich was a small affair from Queen's Road, Peckham, to Goose Green and the Plough, Dulwich; these lines were not later electrified. The London, Deptford and Greenwich (the Southwark and Deptford until 1891) was a small concern running between Tooly Street, Bricklayers' Arms, and Creek Road, Deptford; most of its lines were not electrified, and the last horse tram in London survived on the Rotherhithe Road section until it was closed in 1915. The South-East Metropolitan—another grandiose title—was a cross-line from Greenwich through Lewisham to Catford. The Woolwich and South-East London was a narrow-gauge



*One of the
London
Street
Tramways
cars at
Mornington
Crescent*

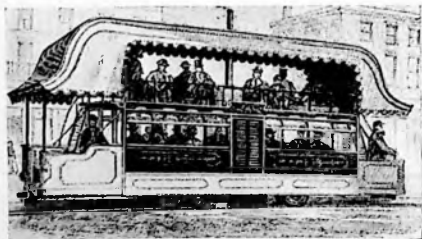
(3 ft. 6 in.) line running from the terminus of the London Tramways in Trafalgar Road, Greenwich, through Woolwich to Plumstead; it had 15 cars in 1890. To the south of London, and not connected with any of its tramways, Croydon had 6 miles of line on the main Brighton Road through the town, first opened in 1879, with 14 cars.

AS can be seen, this complex network of tramways made a heavy call on the supply of horses. The North Metropolitan had hired its horses from the L.G.O.C. until 1878, at 6 $\frac{3}{4}$ d. per car mile, and the London Street Tramways adopted the same system until 1873. Hereafter each company built up its own stables—and they were of considerable size. There had to be eleven horses for every car in service: five pairs to work in shifts, and one horse spare in the stables. A tram-horse's working life was four years—this was six months less than for an omnibus horse; although the trams rolled more readily when in motion, they were heavier and required more effort to start. Stops were more frequent, too: there were, alas, many people who had no compunction in stopping a tram on a sharp rise, when a walk of a few yards would have spared the horses a heavy start.

Steam

London was inclined to be slow off the mark with tramway developments. While a state of masterly inactivity obtained in the capital, provincial towns made the costly and some-

*A contempor-
ary drawing of
Grantham's
steam
tramcar
being tried
out on the
London
tramways
in 1873*



times painful experiments. This was certainly true of the steam tramway locomotive, which was developed in 1876 and tried out in Leicester, Leeds, Newcastle, Glasgow and other cities before its adoption in London in 1885. But the metropolis can boast of an early—if unsuccessful—experiment with a car containing its own steam motive power.

This was a 54-seat double-decker, designed by J. Grantham and built by the Oldbury Carriage & Wagon Co., with Merryweather engine, whose trials took place at midnight of 26 November 1873 in the Vauxhall Bridge Road. The car was entered at the ends, there being separate seats and entrances, and there were two boilers, one each side of the gangway in the centre. The two cylinders (4×10 in.) drove one pair of wheels only, 30 in. in diameter. As designed, the car had four grooved wheels and four road wheels, but it is doubtful whether it ever ran with the road wheels fitted. The trials were not entirely successful, due to lack of steam and to dirt in the rail grooves. The car was sent to the District Railway's depot at West Brompton, where it ran for a time on exhibition, and then was sold to the newly-opened Wantage Tramway near Swindon. Here, rebuilt with only one boiler, it gave a good account of itself, and was finally passed on to the Portsdown & Horndean Light Railway, a tramway near Portsmouth, where it was in evidence, though not in working order, only a few years ago.

At about the same time, Loftus Perkins tried in London his steam tram-horse; a single large rubber-tyred wheel drove and steered: the two wheels at the rear may have been flanged, but it is not clear in the account. The engine had a vertical boiler and two pairs of compound cylinders driving the wheel through gearing.

As has been mentioned, the steam locomotive came to London in 1885, when the North London Tramways Company began operating the first of 15 Merryweather machines on 1 April on the Edmonton line. Ten Dick



*A Dick Kerr
steam
"dummy"
on the North
London
Tramways
about 1890*



A Merryweather engine and trailers on the Edmonton and Stamford Hill line

Kerr engines* were purchased by the same concern in 1886-7, and here development in London stopped.† Why, when many provincial towns adopted steam trams on a very wide scale, did London make so little use of them? The main reason, no doubt, was that the horse-lines would have required fairly considerable modification. Possibly, too, the London public was less ready to accept mechanical monsters in its streets than the North Country mill-workers or the Staffordshire potters.

Compressed Air

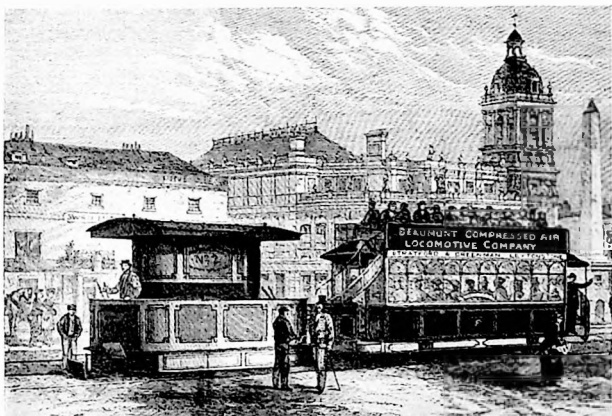
The steam tram was silent and had power to spare, but it remained obnoxious to many. Attempts were made to find a cleaner and more acceptable kind of power. Compressed air had been used in Paris, and for a short time on the Wantage line; a compressed-air "dummy"‡ designed by a Major Beaumont and built by Greenwood & Batley was tried at Woolwich in 1877; an improved one ran for a time about 1881 between Leytonstone and Stratford, but

* Two cylinders 8 x 14 in., driving wheels 2 ft. 6 in., weight 10 ton.

† Two other tramway locomotives were seen in London: a Merryweather on the Wharncliffe National Rifle Association line on Wimbledon Common, one mile long (1877-82); and a Sharp Stewart working on a line 600 yards long laid experimentally at Buckhurst Hill, Epping Forest, in 1874 by F. H. Trevithick, Engineer of the Lisbon Tramways in Portugal.

‡ A word coined to describe a prime mover on the tramway not equipped to carry passengers.

seems to have caused little interest. In 1882 Sir F. Bramwell designed a self-contained compressed-air tram, with two cylinders $5\frac{3}{8} \times 10\frac{1}{4}$ in. and 450 lb. pressure, to work along the Caledonian Road. It was built, but if it ran its life was brief.

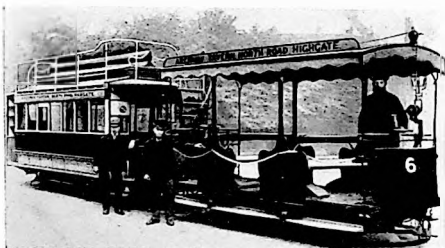


Major Beaumont's compressed-air tram "dummy" being charged with air from a pipe beneath the track at Stratford Broadway : an engraving of the early 'eighties

Cable Traction

Cable traction had a long history and offered special advantages for working hilly routes. As already mentioned, two lines in London were so worked : that up Highgate Hill and that from Kennington Park to Streatham Hill. The former was constructed by the Patent Cable Tramways Corporation, to the 3 ft. 6 in. gauge, and was $\frac{3}{4}$ mile in length, the gradients met with being from 1 in 11 to 1 in 15. Motive power for the cable was obtained from two 25 h.p. engines. It was based on the pattern of the San Francisco tramways. The Brixton Hill line was of standard gauge, and $5\frac{1}{2}$ miles long. The cable itself was 6 miles long, without a break, and ran at 8 m.p.h. in a 9-in. tube 19 inches below the surface. The cars were worked on by horse from

Kennington, and therefore the gripper mechanism by which the tram attached itself to and detached itself from the moving cable was mounted on a "dummy," which was coupled to the car. Later, however, some passenger-



*The
Highgate
cable tram
"gripper"
car and
trailer*

carrying gripper cars were put into service. The Highgate cable line closed in August 1909, and the Streatham line was converted to electric conduit in the same year.

Storage Battery Cars

But the most attractive siren beckoning to tramway engineers was the electric accumulator. It had everything : there was no noise, no smell ; it was suitable for installing in converted horse-cars, and required no alterations to the track. But, alas, this bouncing baby among traction systems was born a heavyweight, and no amount of striving

*Streatham
cable line
passenger-
carrying
"gripper"
car, on
Streatham
Hill
in 1900*



on battery development could make any substantial reduction. Moreover, the charge was good for only 30 miles or so of running, and as time went on it seemed unlikely that this figure could be substantially increased. The first

*A gripper car on
the Streatham
cable line*



trials were made at Leytonstone on 4 March 1882 with a horse-car equipped on the Radcliffe-Ward system. A few months later another car equipped by Greenwood & Batley to the design of Mr. V. G. Lironi ran for a time between Stratford and Manor Park. The South London and West Metropolitan Companies also ran trials at this time. In September 1885 a much-publicised trial was made with a Jarman battery car, weighing $6\frac{1}{2}$ tons, between Blackfriars Bridge and Clapham, taking 29 minutes for the 4 miles on the outward journey and 37 minutes on the return. Then between 1889 and 1893 the General Electric Power & Traction Company worked the Barking Road line



*A contemporary sketch
of a horse-car converted
to battery-traction
running in West London in
1883*

with five 52-seat battery cars, for 4½d. per car mile: on withdrawal the cars had run a total of 76,398 miles. Six battery cars were working between Clapham and Tooting in the spring of 1890, and in 1891 Alderman D. B. Miller, Chairman of the Croydon Tramways Company, converted a horse-car to battery traction at Thornton Heath, but withdrew it after trouble due to acid spilling on the journey.

Internal Combustion

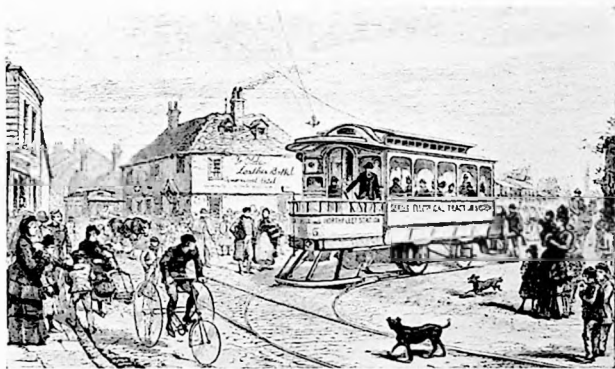
No: the battery car was not the answer. What of that other young hopeful, the internal-combustion engine? Here also there were some good triers. A coal-gas driven car was operated by the Croydon Company. This had two horizontally-opposed cylinders driving a large flywheel encased in the waist-panelling amidships, and its performance seems to have been interesting but unimpressive. The car weighed 5½ tons, and the gas-cylinder, 25 ft. by 4 ft., was charged at 150 lb. A Connelly oil-gas-motor car was tried in 1893 between Tooley Street and Deptford, but without providing much encouragement. This was built by Weymann of Guildford, with a 12½ h.p. engine, and weighed 4½ tons. The truth is that the internal-combustion engine had still more than ten years to go before it was out of its teething troubles. Tramway engineers needed to look elsewhere.

IV

The First Electric Lines

IT is somewhat important here to consider the general position of London passenger transport. In the early 'nineties there was a fully-developed suburban railway system, but trains were mainly slow and uncomfortable, and often reached a London terminus (itself not necessarily in the centre of the city) by very roundabout routes. The motor bus had not been invented, and if it had been the streets were too badly surfaced to have allowed it to succeed. The capacity of the horse-tram had long ago been reached. Therefore, when experiments with electric tramcars supplied

with current from conduits and overhead wires succeeded in Germany, France and N. Ireland, it was certain that the English towns and cities would ultimately follow, in spite of the high capital cost of such installations. A tram had, in fact, been running along the front at Brighton since 1883, though this took current from an open conductor-rail, which was not possible in town streets.



An animated Victorian scene as a Series Electric car on the Northfleet Tramways leaves the depot in 1889: horse-car on left. From a contemporary sketch

The first electric line in the vicinity of London was opened at Northfleet in March 1889, a short extension of an existing 3 ft. 6 in. gauge horse line, from a depot in London Road to Station Road. It was sponsored by the Series Electric Traction Syndicate and built by the well-known firm of Dick Kerr, the cars being built at the Falcon Works at Loughborough, with Elwell-Parker motors. The system comprised a positive and negative cable running in an 8-in. diameter conduit; each car carried a long collector which ran inside the conduit, being connected to the car by bars passing through a slot immediately inside one running rail. At regular intervals the supply cable was broken by a pair of plates, held together by springs: these the collector parted, and in so doing connected the motor terminals to the supply and return cables. The collector was of such a

length that it was always in contact with one pair of plates. The effect of this system, the wiring diagram of which is too complex to discuss here, was that any number of cars could be run at one time in series. With only one car operating, the drain on the generating plant was 60 amps at 165 volts.

In 1891 a short line with overhead trolley pick-up was opened at Roundhay, near Leeds. This was the real progenitor of the London tram as we knew it. Installations followed at a number of towns, mostly on the overhead system, although the more expensive conduit was sometimes used. There were really two forms of conduit: the open, in which a "plough" attached to the car ran in an open slot, picking up current from a live rail in the conduit; and the closed or surface-contact type. There were several variants of the latter system: in every case the cable was laid in a tube beneath the tracks, and connected to frequent electric studs in the roadway surface, which only became "live" when a magnetised "skate" beneath the car ran over them. The overhead trolley was the cheapest system to install, the open conduit costing nearly twice as much, the cost of a closed conduit lying between. The overhead was, however, judged by many to be unsightly, and the surface-contact in practice proved unpredictable in conditions of dirt and ice; sometimes the studs remained alive after the skate had passed, to the detriment of horse-traffic.

V

The Systems Described

THIS, then, was the position immediately preceding the tramway "boom" which occurred at the close of Queen Victoria's reign, and it will now be more convenient to divide the narrative and deal separately with developments in each undertaking.

LONDON COUNTY COUNCIL

The foundations of the L.C.C. system were laid by the purchase of a number of private horse-tramways, although many new lines were opened also. Here is a brief summary of these purchases:

- 1895-6 London Street Tramways and North Metropolitan.*
- 1899 London Tramways.
- 1902 South-Eastern Metropolitan and South London Tramways.
- 1904 London Deptford & Greenwich and London Camberwell & Dulwich Tramways.
- 1905 Woolwich & South-East London Tramways.
- 1906 London Southern Tramways.
- 1909 Highgate Hill and Harrow Road & Paddington Tramways.

Small sections of the Bexley Council (1908), M.E.T. (1912), and L.U.T. (1922) were also purchased, being within the County boundary, though not necessarily worked by the L.C.C.T.

Electrification began to be considered in 1898, but the first electric lines were not opened until 15 May 1903. In 1900, however, a trial line on the conduit system, 256 feet in length, had been laid inside the Camberwell depot, with a Westinghouse bogie car (that exhibited at the Tramways Exhibition of 1898 and subsequently purchased) running upon it. All the early electrification was on the open conduit system; but owing to the great expense involved a section on the Council began to press the claims of the surface-contact system, in particular that of Griffiths & Bedell. The whole thing rapidly became riddled with party politics, the Progressives favouring the conduit and the Moderates the G.B. A trial G.B. surface-contact line was put into operation in 1908 between Aldgate and Bow, and the battle was fought out in the Council Chamber, in an atmosphere far from calm. The G.B. lost, and the trial line was converted to conduit in 1909; but the feud took some time to die down, the G.B. patentees having begun a libel action in which it was alleged that L.C.C. engineers had altered the system detrimentally in the course of installation.

It became clear, however, that London could not indefinitely afford the heavy outlay on conduit construction, and later outer district lines were on the overhead system. All cars except a few of the latest have since been dual-fitted; at the junctions of the two systems cars ran through by merely shedding the "plough" into a siding on the conduit rail, and putting up the trolley booms, and *vice-versa*.

* Leased back to North Metropolitan, which worked them until 1906.

The L.C.C. owned all the track in the County of London, though a small part of it was not worked by them, and their cars ran out over other systems as well. The inner London termini were at Tooley Street ; Hop Exchange and London Bridge, for the Borough ; north end of Southwark Bridge for the City ; Embankment ; Victoria ; Chelsea Bridge (south end) and Chelsea, Kings Road ; Tottenham Court

The first L.C.C. electric car, purchased in 1900 for training drivers, and run at Camberwell. It was a bogie car very similar to the A Class, but with open stairs



Road (Euston Road) ; Bloomsbury and Holborn (Gray's Inn Road) ; Farringdon Street, Smithfield, Aldersgate, Moorgate, Liverpool Street Station and Aldgate. The lines ran out to the County boundaries at Abbey Wood (for the Erith system) ; Eltham ; to join the Bexley system at Plumstead ; Grove Park and Forest Hill ; Norbury, to join the Croydon lines ; Tooting Junction, to join the S.M.E.T. ; Wimbledon, to join the L.U.T. ; Hampstead and Parliament Hill Fields ; and junctions were made with the M.E.T. at Willesden, Archway Road, Manor House, and Stamford Hill ; connection was made with the Leyton line at Lea Bridge and with West Ham at Bow Bridge and Iron Bridge, East India Docks.

Through cars ran over M.E.T. metals to Barnet, Edmonton, Enfield, and occasionally Wembley and Sudbury ; over the L.U.T. to Wimbledon, Acton, and in summer-time to Hampton Court ; over the Croydon Corporation line to Purley ; and over Leyton metals to Bakers Arms, and on

Sundays to the Rising Sun. In the other S.W. Essex boroughs the through workings were too complex to detail.

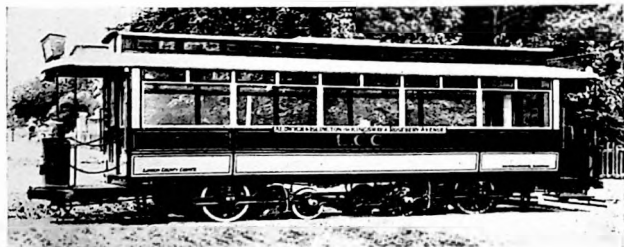
There was at first no connection between the L.C.C.T. lines north and south of the river : car movement required fairly complex running over "foreign" lines. Plans were made for a link-up *via* a tramway tunnel to be constructed between the projected Embankment line at Waterloo Bridge and the Theobalds Road line (then horse-worked by the North Metropolitan), with a new stretch to be built along Rosebery Avenue to the Angel. This tunnel was opened with clearances for single-deck cars only, on 24 February 1906 from the north end to Aldwych tram-station. The lower portion below Aldwych was used as a repair depot until the completion of the Embankment Westminster Bridge-Blackfriars Bridge link enabled it to be opened throughout on 10 April 1908. The tunnel was closed on 2 February 1930 and re-opened with clearances for double-deck cars on 14 January 1931. The length is 3,500 ft. and the maximum gradient 1 in 10.

In 1932 the L.C.C.T. had 167 route miles, including the Leyton system then operated by them. The L.C.C. electric rolling stock, a table of which appears below, was always of serviceable design. The first order was for 100 open-top bogie cars (A Class) and 100 open-top four-wheelers (B



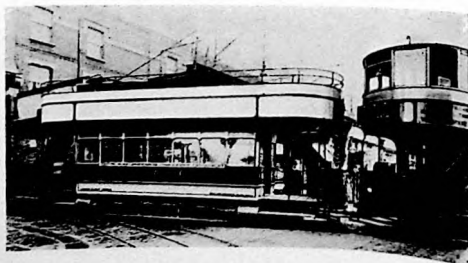
A "set-piece" photograph taken at about the time the first L.C.C. electric line was opened on 15 May 1903. The car is A Class No. 50

Class). The D and C Classes, which followed, were almost identical in every respect. The A, B, C, and D Class, cars were soon rebuilt with covered tops with balcony ends, and later the top decks of all cars were vestibuled. In 1907 the rather more substantial E Class bogie car was inaugurated, and in 1908 the decision was taken to standardise the similar E1 Class ; 1,000 were built between that date and 1922, and very many will be running right up to the end. In 1911 the notion was propounded that single-deck cars



The L.C.C.T. G Class single-decker car, designed to work the Kingsway Subway routes

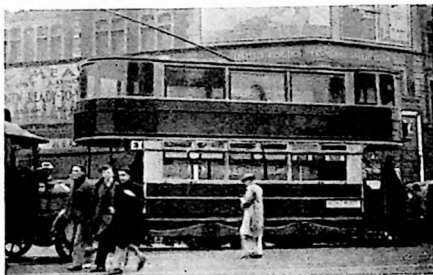
coupled in pairs would be preferable to double-deckers, and experiments with pairs of Kingsway subway cars were carried out on the Hampstead Road. The possibility of letting double-deck cars haul trailers during rush periods was also mooted. Two were put on in January 1911 between Euston Road and Hampstead, by arrangement with the Board of Trade, but were stopped by police action ;



*L.C.C.T.
trailer car
of the
Great War
period*

later they were restarted and also ran between Embankment and Tooting. A total of 158 trailers were taken on the strength during the 1914-18 War, the last being withdrawn in 1922. Meanwhile in 1912 the last class of four-wheeler (M) had been introduced.

*An L.C.C.
M Class
four-wheeler at
Hammersmith
on
Boat Race Day
1932*



In 1925 the Council set themselves new standards with the so-called "Pullman" cars, E1 Class vehicles reconstructed with comfortable reversible seats on both decks : by the end of 1929, 850 cars had been converted.

In 1930 a new class of four-motor car for hilly routes, the HR1/2, was begun ; the bodywork showed little change from the E1 Class, and the outline was, in comparison with the cars being developed by the private companies north of the river, a little archaic. A new class two-motor maximum-

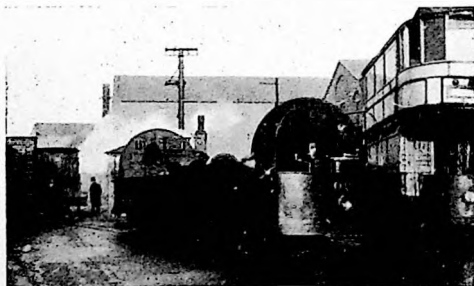


*The re-opening
of the
Kingsway
subway:
special white
E3 car
No. 1931
about to enter
lower portal*

traction car, the E3, came out at the same time. There were now only 115 of the old A and D Class remaining in service ; the B Class had long been obsolete and the C Class had recently bowed itself out. The " Pullman " cars were painted light red in distinction from the normal chocolate and cream, and this became standard livery, though none of the A, C or D cars ever sported it. It is worth mentioning, perhaps, that some of the early E1 cars had been painted Midland red ; in 1927 one car was painted orange, and in 1932 two E1 cars appeared in aluminium finish.

For special occasions, individual cars were painted white and blue. One car to carry this livery was the very fine No. 1, an experimental type on HR2 trucks which appeared

*L.C.C.T.
wheel-car
No. 012
(Mountain
& Gibson
truck) ; it
has just been
shunted out
of Charlton
depot by the
steam
locomotive
(left)*



in 1932, with air-brakes, driver's seat, windscreen-wipers, and other refinements. Windscreens had begun to be fitted in 1931, and later became a standard item.

Class	Numbers	Date	Wheels	Seats	Body	Trucks	Motors
A	1-100	1903	8	66	Dick Kerr	Brill	2 × 37 h.p.
B	102-201	1903	4	56	Dick Kerr	Brill 21E	DK 24A
C	202-301	1905	4	56	Dick Kerr	Brill 21E	West'hsc
D	302-401	1905	8	66	Brush Dick Kerr	McGuire	West'hsc
F	552-567	1906	8	36	Dick Kerr	M. & G.	2 × 42 h.p.
G	568-601	1906-8	8	36	Brush	M. & G.	2 × 42 h.p.
E	402-551 602-751 }	1907	8	71 -76	Hurst Nelson	M. & G.	2 × 42 h.p.
E1	752-1426	1907-10	8	73-78	Brill Hurst Nelson L.C.C.		2 × 42 h.p.
	1477-1676	1910-13	8	„	Brush		2 × 42 h.p.

Class	Numbers	Date	Wheels	Seats	Body	Trucks	Motors
E1	1727-1776	1920-1	8	„	Hurst Nelson	Met-Vick.	2 × 60 h.p.
	1777-1851	1921-2	8	„	Hurst Nelson	English Elec.	2 × 60 h.p.
M	1427-1476	1912-13	4	60-	Hurst Nelson	Mountain	
	1677-1726	1912-13	4	62		& Gibson	2 × 42 h.p.
HR1	1852	1930	8	74	L.C.C.	E.M.B. Co.	M.V. 109
							4 × 35 h.p.
HR2	1853	1930	8	74	L.C.C.	E.M.B. Co.	M.V. 109
	1854-1903	1930	8	74	English Elec.	E.M.B. Co.	M.V. 109
HR2	101-160	1930-1	8	74	Hurst Nelson	E.M.B. Co.	M.V. 109
E3	1904-2003	1930-1	8	74	Hurst Nelson	E.M.B. Co.	Eng. Elec. D.K. 126A
							2 × 57½ h.p.
E3	161-210	1930-1	8	74	English Elec.	E.M.B. Co.	Do.
—	1	1932	8	66	L.C.C.	E.M.B. Co.	M.V. 109

M. & G. : Mountain & Gibson.

Notes.—All the above were double-deck, except the F and G Class subway cars. When the Kingsway subway was reconstructed in 1930-31, these were rebuilt to conform with the E1 Class.

The original experimental car was allotted No. 101; in 1921 it was cut down to a single-decker and re-numbered 110, the B Class of that number being re-numbered 101.

One E Class survived, rebuilt and renumbered 1597, until 1951 (44 years). Three M Class cars (1441, 1444, 1446) were rebuilt as ME/3 bogie cars; No. 1446 (No. 1370 since rebuilding) is now Class E1. Nos. 1852/3 had the plough-carrier on bogie. HR2 No. 160 later reclassified E3. Nos. 101-160 did not carry trolley-booms. M Class No. 1726 rebuilt on roller-bearings; in 1933 cars 835 and 1360 were fitted with bows, and 844 and 1172 with pantographs.

During 1914-18 War a few B Class were converted to petrol-electric, on the Tilling-Stevens system. The engine was housed on one platform.

Class H were watering cars, Nos. 01-04; Classes J, K and L covered a number of stores vans (05-014). Class E2 was an improved E1 designed in 1920, but not constructed.

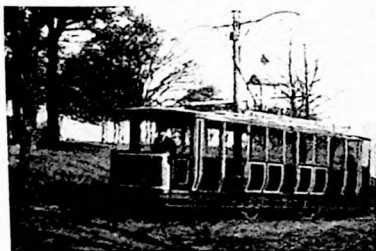
Until 1932 the conduit did not go inside the Charlton repair depot; trams ran in under momentum and were propelled out by L.C.C.T. steam locomotive No. 1 (0-4-0 ST, Andrew Barclay No. 998).

At one time there were 39 snow-brooms and one stores car converted from B and C Class cars.

METROPOLITAN ELECTRIC TRAMWAYS

Although the M.E.T. was incorporated in 1894, it did

not begin operations until the Finsbury Park—Tottenham and Manor House—Wood Green sections of the old North London Suburban lines, converted for electric working, were brought into use on 22 July 1904. Thereafter the undertaking expanded rapidly, and became the second largest in London, operating 53½ route miles, including the lines of the Middlesex County Council, which the M.E.T. always worked.



*The first electric tram
in Middlesex : the
Alexandra Park
Electric Railway, 1898*

The M.E.T. enjoyed an average speed for its cars of 10½ m.p.h. against the L.C.C.'s 9½ m.p.h., probably on account of having less traffic congestion on its outer-suburban lines. The last line to be completed was that from Ponders End to Enfield (1911). On 1 August 1912 the Finsbury Park—Manor House section was taken over by the L.C.C., and through running on to the Council's system began. On 1 January 1913 the company passed under control of the



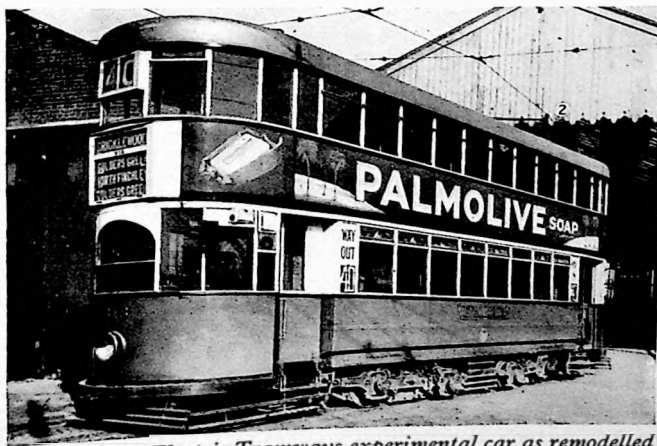
*Metropolitan
Electric
Tramways
E type
single-decker
No. 141*

M.E.T.
H type
car



Underground group. One small portion of the route had an interesting history: in 1898 the Alexandra Palace Electric Railway was opened, 660 yards of standard gauge ballasted track. It was worked by the Wandruszka Electrical Company of America, with two single-deck 60-seat trolley cars of Continental make. In 1899 this line was lifted; but in 1904 the site of it (by now a road) was used to lay the M.E.T. line.

The M.E.T. lines were all in the Counties of Middlesex



Metropolitan Electric Tramways experimental car as remodelled
1929, the "Bluebell"

and Herts., with outer terminals at Waltham Cross, Enfield, Alexandra Palace, Barnet, Canons Park, Sudbury, and Acton. There was, however, through running into the County of London, over L.C.C.T. metals.

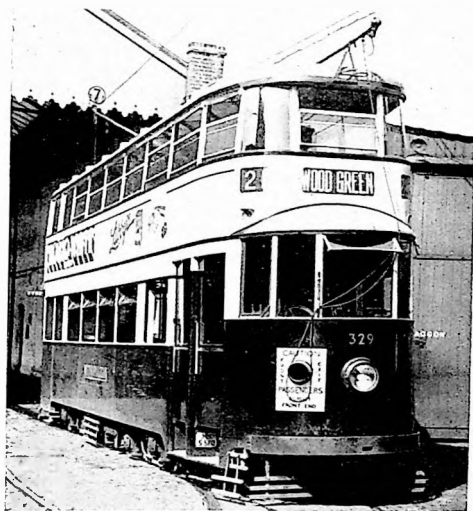
The Company's early cars conformed in standards with other London lines. But in 1927 the M.E.T., in conjunction with another Underground group line, the L.U.T., was busy developing a more modern type of car. The experimental car called "Bluebell" was followed by the acquisition of a large number of the Union Construction Company "Feltham" cars. This type is the fastest seen in London, and measures 40 feet in length, with upholstered seats for the driver, pneumatically-operated doors, hand, magnetic and air brakes, and other refinements. The acceleration is remarkable: 20 m.p.h. can be reached in 20 seconds.

The M.E.T. pioneered the trolley-bus in London, with a B.T.H. single-deck car which ran inside the Hendon depot as an experiment in 1909. It was not then followed up.

ROLLING STOCK TYPES

Type	Numbers	Date	Wheels	Seats	Body	Trucks	Motors
B2	1-70	1904-5	8	66	Brush	Brush	
A	71-130	1905	8	70	Brush	Brush	
E	131-150	1905	4	36	Brush	Brush (radial)	
C2	151-165	1907	8	70	Brush	Brush	
D	166-191	1907	4	54			2 x 37½ h.p.
C1	192-211	1909	8	74		M. & G.	
F	212-216	1909	8	78		M. & G.	2 x 37½ h.p.
G	217-236	1909	8	74	Brush	M. & G.	
G	317	1922	8	74		M. & G.	
H	237-316	1903-12	8	78		M. & G.	
H	2, 12, 22, 31, 46, 82	1923-4	8	73		M. & G.	
Bluebell	318	1927	8	71	M.E.T.	M. & G.	
U.C.C.	320, 330	1929	8		U.C. Co.		2 x 60 h.p.
U.C.C.	331	1929	8		U.C. Co.		4 G.E.C.
U.C.C.	319	1931	8	64	U.C. Co.		2 x 70 h.p.
U.C.C.	321-9	1931	8	64	U.C. Co.		2 x 70 h.p.
U.C.C.	332-375	1931	8	64	U.C. Co.		2 x 70 h.p.

All B2 and C2 cars and 14 type A cars were re-motored with 2 x 40 h.p. high-speed motors about 1930. No. 77 was rebuilt and vestibuled. Four type E went to New Zealand in 1908. Two were on loan to S.M.E.T. about 1920. Type D No. 191 was acquired from Leicester. Nos. 320, 330, 331 were experimental "Feltham" cars; No. 331 was a centre-entrance car sold to Sunderland Corporation.



*The
ultimate
in London
tramcar
design, the
Union
Construction
Co.
"Feltham"
car*

Types B (B2 after being top-covered), A, C2, D, C1, G were originally open-top : types F, H and later cars were vestibuled on top deck.

The E Class were single-deckers.

LONDON UNITED TRAMWAYS

The nucleus of this system was the old West Metropolitan Company, though many important extensions were made after the L.U.T. was re-incorporated in 1901 (first incorporated 1894). The electric services from Shepherds Bush and Hammersmith to Kew Bridge and Acton, which commenced on 4 April 1901, were the first in the London area apart from the Alexandra Palace Railway and the Northfleet experiment. In its final form the Company operated 29 route miles, extending out to Twickenham, Hampton Court, Hounslow, Uxbridge and Thames Ditton, and making connection with the L.C.C. lines at Wimbledon Town Hall and Hammersmith.

On 1 January 1913 the undertaking passed under the control of the Underground Group : on 16 May 1931 the

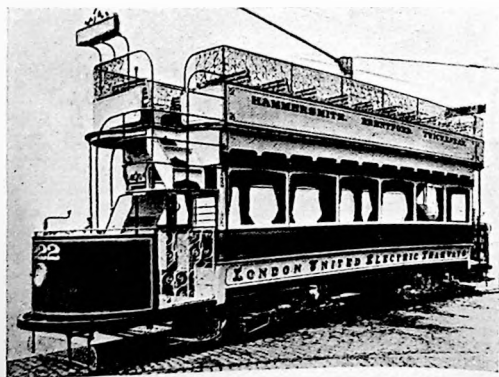
L.U.T. placed in service the first trolley-bus in the London area, on the Twickenham Junction—Teddington route, the success of which led in a few years to the disappearance of the tram in the western suburbs.



This L.U.T. single-decker was advertised for hire for weddings, funerals, etc. It was known as a "social saloon."

The best known of the L.U.T. cars were the landing staircase types first delivered. They survived more or less unaltered, except for the fitting of covered top, until well

*London
United
Tramways
W type
car No. 222
as delivered
in 1902*



into the 'thirties, and these square-ended old gentlemen undoubtedly played a great part in persuading the public that tramways were out of date. Travellers used to the L.C.C. cars often gazed astonished upon these vehicles when first met on some excursion outside the Council's domain.

Several of the L.U.T. lines did not develop very heavy traffic, and in January 1922 a one-man-operated car was put on as an experiment between Tolworth and Richmond Park, and three years later three more of these cars were introduced ; they were withdrawn in November 1928.

ROLLING STOCK TYPES

Type	Numbers	Date	Wheels	Seats	Body	Trucks	Motors
Z	1-100	1901	8	70		Peckham	2 x 25 h.p.
X	101-150	1901	8	70		McGuire	2 x 25 h.p.
W	151-250	1902-4	8	70	B.E.C. Co.	Brill	2 x 25 h.p.
U	251-300	1902-4	8	70		Brill	2 x 25 h.p.
T	301-340	1907	8	74		Brill	2 x 40 h.p.
S1	341	1922	8	32		Brill	2 x 25 h.p.
S2	342-4	1925	8	32		Brill	2 x 25 h.p.
Poppy	350	1927	8		L.G.O.C.		
U.C.C.	351-396	1931	8	64	U.C. Co.		2 x 70 h.p.

B.E.C. Co. : British Electric Car Co.

L.G.O.C. : London General Omnibus Co.

Types Z, X, W, U were originally open top : all except the X type and eight of the W type cars were later fitted with



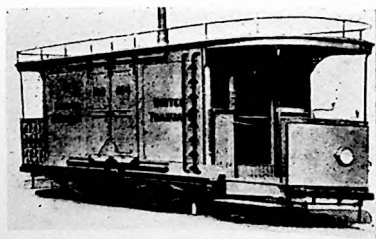
An early L.U.T. service vehicle



L.U.T. single-decker S2 type car No. 342

covered tops, type Z becoming type Y in the process. Type T had covered top with balcony, and U.C.C. vestibuled top and lower decks. Eight cars of type W were given top covers and higher h.p. motors 1923/8 and became type U2 and WT respectively. Types S1 and S2 were single-deckers, rebuilt from double-deckers, and were fitted with air-brakes. The U.C.C. or "Feltham" cars developed from the "Poppy" experimental car, were acknowledged everywhere to be the most up to date in the country: a large number of them will be running on the Leeds tramways after the London trams are abolished.

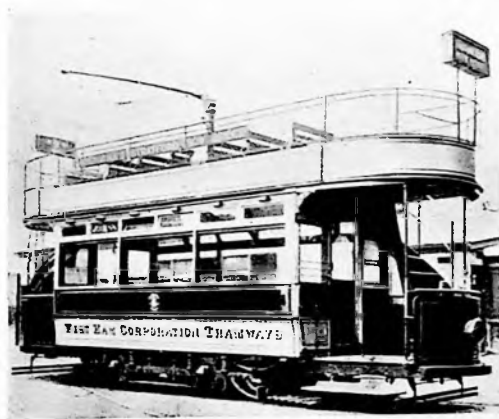
At one time the L.U.T. were much inconvenienced by flooded roads around Malden, and cars 141/2 were rebuilt for flood service, one with motors above the floor and the other as a trailer.



An L.U.T. stores van of 1903, by the British Electric Car Co.

COUNTY BOROUGH OF WEST HAM

The nucleus of the West Ham system was certain lines of the old North-Met, acquired by an Act of 1898; but some additional mileage was also constructed. The first electric line (from Stratford to Abbey Arms *via* Plaistow) opened on 27 February 1904. The system embraced such populous centres as Canning Town, Forest Gate, and Stratford: particularly heavy traffic developed in connection with the West Ham football crowds: sometimes the tramway was called upon to move 20,000 people in half an hour. In



*One of the
first cars
of the
West Ham
Tramways*

1932 the West Ham's route mileage was 16.27 miles, with its extremities at the Victoria and Albert Docks, Thatched House (Leyton Broadway), Wanstead Flats, and Bow Bridge.

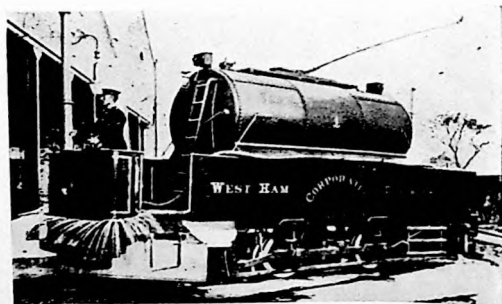
ROLLING STOCK TYPES

Numbers	Date	Wheels	Seats	Body	Trucks	Motors
1-50	1904	4	56	Milnes	Brush	2 × 25 h.p.
51	1905	4	60	Brush	Conaty	2 × 25 h.p.
			(as built)		radial	
52-85	1905	4	60	Brush	M. & G.	2 × 25 h.p.
			(as built)			
86-93	1906	4	58-	Milnes-	M. & G.	2 × 30 h.p.
94-100	1906	4	62	Voss	radial	
101-106	1910	4	58	United	Peckham	2 × 35 h.p.
			(as built)	Electric		

Numbers	Date	Wheels	Seats	Body	Trucks	Motors
107-118	1911	8	78	Hurst	Hurst	2 × 40 h.p.
			(later 74)	Nelson	Nelson	
119 & 60-63/5	1923-4	4	60	W. Ham Corp.		2 × 35 h.p.
119-124	1925	8	78	Eng. Elec.		2 × 50 h.p.
125-127	1925	8	69	W. Ham Corp.		2 × 50 h.p.
128-137	1926	8	69	Brush		2 × 50 h.p.
138	1928	8	69	W. Ham Corp.		2 × 50 h.p.
81-85	1929	8	69	Brush		2 × 50 h.p.
69-80	1929-30	8	73	Brush	{	2 × 50 h.p.
68	1931			W. Ham Corp.		

Car 51 originally was fitted with the Raworth regenerative system, but was rebuilt to standard. Nos. 52-9 were entirely reconstructed in 1922. Nos. 38 and 11 were also rebuilt. The 128-137 series was re-motored and re-trucked 1946-7.

A
West Ham
watering
car of about
1906



Nos. 1-93 were originally open-top, 94-118 balconied covered top, 119 onwards vestibuled top. All open-tops were later covered.

Car 119 was later renumbered 64.

SOUTH METROPOLITAN ELECTRIC TRAMWAYS AND LIGHTING Co., LTD.

This Company, which opened its first lines in 1906, became part of the Underground Group on 1 January 1913.

Route mileage in 1932 was 13.08. The cars were red (earlier green). The termini were at Penge, Crystal Palace, Sutton and Mitcham, connection being made with the L.C.C.T. at the latter point. The S.M.E.T. worked the Croydon Corporation's Selhurst line.

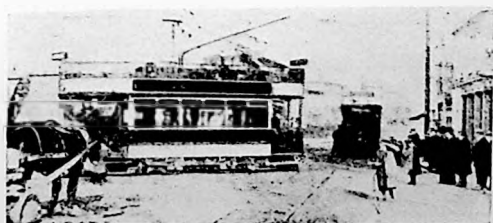


A South Metropolitan L type bogie car

ROLLING STOCK TYPES

Type	Numbers	Date	Wheels	
J	1-16	1906	4	
K	17-26	(1906)	4	ex-Croydon
L	27-29, 31, 35	(1906)	8	ex-Croydon
O	30, 32-4	(1906)	8	ex-Gravesend
M	36-51	1906	4	
P	17, 21, 47, 52	(1930)	4	ex-Croydon

Dates in brackets are dates of acquisition by S.M.E.T.



*At Croydon
in 1906
soon after
the opening
of the
S.M.E.T.
Croydon—
Sutton line*

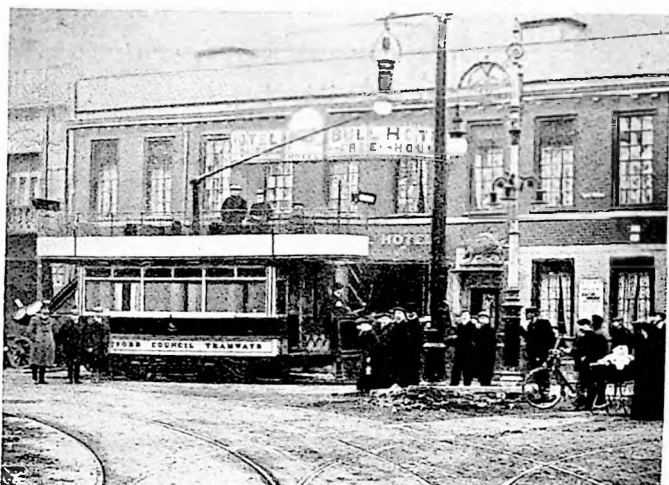


S.M.E.T. M type car No. 50 at Anerley Station in 1932

Also 10 cars acquired September 1931, ex-L.U.T. type U. S.M.E.T. trucks included Brill, Brill radial and Milnes: motors by Westinghouse, B.T.H. and Brush. In 1928 the first cars with upholstered seats appeared. Type M had specially powerful motors for working the hilly West Croydon—Crystal Palace route.

BEXLEY COUNCIL TRAMWAY & DARTFORD LIGHT RAILWAYS

The Bexley U.D.C. opened its line from Plumstead (Plume of Feathers) to Gravel Hill, Bexleyheath, with a short branch from Bexleyheath Market Place to Northumberland Heath, on 3 October 1903. On 14 February 1906 the Dartford Council began operating its line from Gravel Hill, Bexleyheath, to Stone (Horns Cross), with two branches in Dartford. In practice, cars worked through over 500 yds. of Bexley track to Bexleyheath Market Place. In August 1917 the Dartford cars were all destroyed in a fire at the depot, and the Bexley Council operated its lines until March 1921, when a new agreement for a joint undertaking was entered upon. The total length of both lines was 10.28. From 1908, Bexley cars ran through to Beresford Square (L.C.C.T.). The Dartford cars were 12



One of the Dartford Council Tramways ill-fated cars poses officially before the opening of the line



*Bexley Council
car No. 11
on a special
working near
Northumber-
land Heath
in 1930 :
Erith car
beyond*



*Bexley
car No. 24,
formerly an
L.C.C.T.
B Class
Car*

open-top four-wheelers with Brill 21E trucks. The Bexley cars were painted brown and cream :

<i>Numbers</i>	<i>Date</i>	<i>Wheels</i>	<i>Seats</i>	<i>Body</i>	<i>Trucks</i>	<i>Motors</i>
1-16	1903-4	4	52	Dick Kerr	Brush	Dick Kerr 25A
17-39	1917-8	4	60	Dick Kerr	Brill	Dick Kerr 25A

Nos. 17-39 were ex-L.C.C.T. B Class covered-top cars, transferred to maintain service after the Dartford fire. Nos. 34-39 were withdrawn after the 1914-18 War, which had brought heavy munition-worker traffic to this line.

COUNTY BOROUGH OF CROYDON

The early years of this line, opened on 9 October 1879, have already been mentioned. Electric services were

inaugurated between West Croydon and Selhurst in March 1902, and on 26 September 1901 on the Norbury—Purley line. Between 1 January 1902 and 1 June 1906 the lines were leased to British Electric Traction Co. The total extent was only 9.28 route miles, but from 1926 cars worked through over L.C.C.T. metals to Embankment.

A branch from George Street to Addiscombe (opened 6 March 1882) was closed 31 March 1927.

Rolling stock during the B.E.T. period 45 cars as follows :

Croydon
W1 car
No. 13
passing
S.M.E.T.
M type car
No. 38,
in Penge Road,
1932



1-17, 4-wheel, on Peckham trucks.	Transferred to Corporation
18-35, 4-wheel, on Brill trucks.	Transferred to Corporation
36-45, 4-wheel, on Milnes trucks.	Transferred to S.M.E.T.
46-55, 8-wheel.	Transferred to Corporation
56-60, 8-wheel.	Transferred to S.M.E.T.

Added in : 1906—Nos. 36-45, Brush 4-wheel cars, with Brill trucks.
1906—Nos. 56-60 Brush 4-wheel cars with M. & G. trucks
1907—Nos. 61-70 Brush 4-wheel cars with M. & G. trucks.

Added before : 1911—Nos. 71-75 Brush 4-wheel cars with Brush trucks.

In 1927 the stock was :

Class	Numbers	Date	Wheels	Seats	Body	Trucks	Motors
W/1	1-20	1902-12	4	50-54	Brill Brush M. & G. Brush	Brill	G.E.C. 2 x 65 h.p.
B/2	21-30 31-55	1902 1926-7	8 8	64 69	Hurst Nelson		

The last class were for working the through service to the Embankment : similar to L.C.C.T. E1, but did not carry class mark. The cars were originally painted dark chocolate and cream, and later dull red with grey lower panels.

WALTHAMSTOW CORPORATION

This system, comprising only three routes (8.93 miles), opened complete, with electric traction, on 3 June 1905. Its history was uneventful, and its rolling stock showed an orderly progression towards modernisation, the last cars being delivered not long before the undertaking's absorption in the L.P.T.B. The extremities of the system were : Baker's Arms, Napier Arms, Chingford Mount, Higham Hill and Ferry Lane. The cars were painted brown with dull yellow lower panels.

ROLLING STOCK TYPES

<i>Numbers</i>	<i>Date</i>	<i>Wheels</i>	<i>Seats</i>	<i>Body</i>	<i>Trucks</i>	<i>Motors</i>
1-32	1905	4	52	Brush	Brush	2 × 25 h.p.
33-38	1911	4	56	Hurst Nelson	Hurst Nelson	2 × 30 h.p.
(39-46)	1919	8	36		Brill	4 × 25 h.p.
47-52	1920	8	69			2 × 25 h.p.
53-64	1927	8	69	Hurst Nelson		2 × 63 h.p.
39-46	1931-2	8	69	Brush		2 × 63 h.p.

Of the original Nos. 39-46 (ex-Rotherham Corporation) four were scrapped and four renumbered 47-50. Nos. 47-52 were ex-L.U.T. cars. Nos. 1-32 were originally open-

*Walthamstow
four-wheeler No. 32 of
1905, as later fitted with
covered top*



top, later covered : 33-38 were built with covered tops and balconies ; 53-64 (later renumbered 51-62) and 39-46 were built with vestibuled top, the latter also having driver's screens.

COUNTY BOROUGH OF EAST HAM

The East Ham undertaking was opened on 22 June 1901, with electric services from Manor Park Broadway to the Beckton road, and along the Barking and Romford roads. This was the second earliest electric system in London, and was considered worth a full-scale article in the U.S.A.'s *Street Railway Journal*. The total mileage was only 8.34, extending to the Royal Albert Docks, Green Street and Wanstead Park. The rolling stock was as follows :

	<i>Built</i>	<i>Wheels</i>	<i>Seats</i>	<i>Body</i>	<i>Trucks</i>	<i>Motors</i>
45 cars	1901-11	4	56	Dick Kerr	Brill	2 × 25 h.p.
11 cars	1919-21	4	56	Brush	Peckham	2 × 40 h.p.
20 cars	1926-7	8	71	Brush	Brush	2 × 60 h.p.

The first cars were originally open-top (some with reversed stairways), but were later given round-topped roofs with balconies : the second batch had flat roofs and balconies, the last class being vestibuled.

BOROUGH OF ILFORD

The 7.13 miles of this undertaking were opened in March 1903 ; the line ran from Ilford to Chadwell Heath and Barkingside, and a junction with the Barking tramways at Loxford Bridge was effected in 1905. Connection was made at Ilford Broadway with the East Ham lines.

ROLLING STOCK

	<i>Built</i>	<i>Wheels</i>	<i>Seats</i>	<i>Body</i>	<i>Trucks</i>	<i>Motors</i>
6 cars	1903	8	69	Hurst Nelson	Hurst Nelson	2 × 30 h.p.
16 cars	1903-4	4	57	Hurst Nelson	Hurst Nelson	2 × 25 h.p.
29 cars	1909-26	4	54-8	Brush	Brill & Peckham	2 × 35 h.p.
8 cars	1932	4	68	Brush		

The first class was converted in 1923 to four-wheelers on Ilford long-wheelbase trucks, and these trucks were later fitted also to the second batch. The last batch of eight cars were sold to Sunderland Corporation. In 1916 two cars were obtained from the Barking Council. The livery was red (later green) and cream.



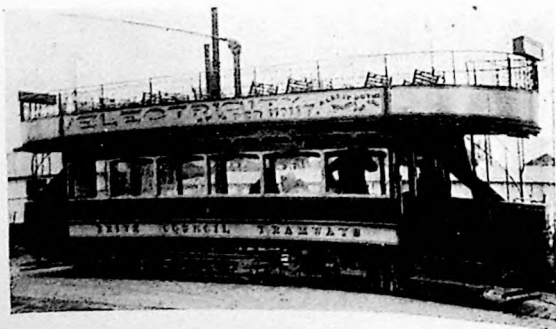
*West Ham
car No. 129
at Bow Road
station in 1933*

The 1932 cars had no windshields, as the General Manager considered open platforms to be healthier.

ERITH U.D.C.

This small system comprised a line 5.42 miles from the L.C.C.T. at Abbey Wood to the Bexley line at Northumberland Heath, with a short branch from Erith to North End. It was opened on 21 August 1905, being electrically worked. The branch was closed, but re-opened 1906 with P.A.Y.E.* cars, and finally closed soon after. In practice, Erith cars worked through from Northumberland Heath to the Market Place, Bexleyheath, over Bexley metals. The rolling stock,

* Pay As You Enter: one-man operated cars, also known as 'demi-cars.'



*One of the
Erith
Council
Tramways
bogie cars*

a somewhat mixed collection, comprised open-top four-wheelers, Nos. 1-6 and 9, with Mountain & Gibson trucks, having Westinghouse 49B motors, body by Brush, closed-top (with balconies), four-wheelers ; Nos. 7, 8, 10-14, with the same equipment ; ex-L.U.T. type X bogie cars, Nos. 15-18, later re-trucked and rebuilt with rounded ends and normal stairs to upper deck ; and ex-Hull Corporation bogie car No. 19, bought 1916, with covered top. Other cars have worked on the Erith tracks, including two small "Pay as you enter" cars with Mountain & Gibson trucks, 1907-16,



Erith Council covered-top four-wheel car

further L.U.T. cars on loan, and after formation of L.P.T.B. various Croydon, East Ham and L.C.C. cars. The Erith cars were originally painted sea-green and later a rather dingy dark red.

GRAVESEND & NORTHFLEET ELECTRIC TRAMWAYS LTD.

This standard gauge conversion of the former narrow-gauge line, mentioned earlier, opened on 2 August 1902, and measured 6.47 miles. The line was closed on 28 February 1929 ; the first within the orbit of Greater London to do so. Its history was marked by some Gilbertian disputes between the parties involved : one arose from the fact that Gravesend Council objected to the fact that current supplied by them "for traction purposes" had been used also to light the car shed at Northfleet.

It had always been expected that the Gravesend system would be connected with Dartford, whose system ended at Horns Cross only $1\frac{1}{2}$ miles from the former Company's terminus at Swanscombe: but this did not materialise, although an order was secured. Livery: brown and cream (No. 1 white), from 1921, red and lemon.

ROLLING STOCK

<i>Numbers</i>	<i>Date</i>	<i>Wheels</i>	<i>Body</i>	<i>Trucks</i>	<i>Motors</i>
1-10	1902	8	Dick Kerr	Brill	Dick Kerr
11-20	1902	4	Dick Kerr	Brill	Walker
9 & 10	1904	4	Brush		2×27 h.p.
1-4		4	Brush		2×27 h.p.
5 & 6		4	Brush		
7 & 8	1921	4	Brush		

Nos. 5 and 6 were ex-Jarrow and District, Nos. 7 and 8 ex-Taunton E.T. Co., Nos. 7-10 were single-deck, the last two being demi-cars. The original Nos. 1-10 were transferred between 1904 and 1909 to other B.E.T. systems (four to S.M.E.T. becoming Nos. 30, 32-4; four to Swansea becoming 42-5, and two to Jarrow).

BOROUGH OF LEYTON

The Leyton lines were acquired from the North Metropolitan and Lea Bridge, Leyton & Walthamstow Tramways, already mentioned. Electric traction began on 1 December 1906, and operation was handed over to the L.C.C.T. on 1 July 1921. There were 60 four-wheel cars (Nos. 11-70) built 1906-10 by Milnes Vossion on Mountain & Gibson trucks with Westinghouse 2×30 h.p. motors. In 1930 the L.C.C.T. allocated 50 E3 Class cars to these workings.

BOROUGH OF BARKING

The first service was begun on 1 December 1903, between Gascoigne Road and Beckton Gas Works. Part of the Barking system was always worked by Ilford, and operation by the Borough ceased in February 1929, when L.C.C.T. and East Ham took over the remainder. The connection with Ilford was at Loxford Bridge.

The original stock was 7 Brush four-wheel open-top

cars, with reversed stairs ; some were covered and fitted with normal stairs later. The stock figure rose to 9 during the year prior to the Great War, but declined to 6 by February 1929.

VI

Conclusion

ON 1 July 1933 the tramways of London passed to the ownership of the London Passenger Transport Board. The rivalry between tram and bus, which had been sharp indeed before World War I, and which had continued brisk in South London, was at an end. The

*The
experimental
L.C.C. car
No. 1
running in
white and blue
livery, 1932*



tramcar's future was no longer in its own hands, but would be decided by a body supposed by many to be bus-minded. For a while the scene showed little change. Some cars strayed from their usual stamping-grounds ; those fascinating little stores cars were seen less often as their duties were taken over by road-vans ; bereft of their parochial ownership the smaller systems looked even less likely to survive. With the general support of the public, the Board decided that the replacement of trams by trolley-buses should be accelerated. By 9 June 1940 there were no trams north of the river except for the subway routes. The "Feltham" cars, too good to scrap, were put to work south of the river, although their great overhang over each bogie made them

unusable on many routes. Throughout the war those trams that were left did a grand job : a number met a more honourable end than might have been hoped for, under enemy bombardment. Afterwards, the shortage of buses brought about a further respite : but when the supply of new buses seemed assured, the decision was taken to abandon trams entirely, putting oil-engine buses, not trolleys, in their place. The first stage of this abandonment took place on 1 October 1950.

This decision was due not only to a preference for the bus's mobility. The fact was that the tracks and cars urgently needed replacement and the cost of doing so would be prohibitive. Already derailments were becoming frequent, and many of the E1 cars had to have their bodies braced by metal straps. The last tram in London ran in the early hours of the night 5/6 July 1952. But at the time of writing (April 1955) a number of the U.C.C. cars are still doing yeoman service in the provinces.

So the clang of the London tram has lately faded into silence—gone to join the last note of a pavement cornet-player, the cry of the last muffin man. Was the tram a good thing or bad? It was part of the London scene for close on a century. It had a hard part to play, but on the whole played it well. The tram was much maligned ; but soon, no doubt, it will begin to feel the benefit of that kindly motto : "*De mortuis nil nisi bonum.*"

L.P.T.B. No.	Former No.	Former Owner	Type
2169-2254	237-314, 316, 2, 12, 22, 31, 46, 82 & 315	M.E.T.	H
2255	318	"	Bluebell
2256-60	212-216	"	F
2261	317	"	G mod.
2262-81	217-236	"	G
2282-2301	192-211	"	C1
2302-2316	131-150*	"	E
2317	350	L.U.T.	Poppy
2318-2357	301-340†	"	T
2358-2402	151-300*	"	U
2403-5	155, 199, 288	"	U2
2406-2410	157, 161, 211, 243 & 261	"	WT
2411	247	"	UX
2412-2466	71-130*†	M.E.T.	A
2467-2482	1-70*	"	B2
2483-2497	151-165	"	C2
2498-2521	1-70*	"	B
2522-2529	151-250*	L.U.T.	W

* Not complete series ; survivors only.

† Not renumbered in correct sequence.

‡ 307 became 2357, not 2324 ; otherwise renumbered in order.

Before renumbering was carried out, cars carried the following letter suffixes : Bexley C, Erith D, Croydon E, Ilford F, East Ham G, West Ham H, Walthamstow K, Southmet S. No new numbers were ever carried by Bexley, Erith and Southmet cars ; the original number and suffix was retained even after repainting of certain Erith and Southmet cars. No Bexley cars survived long enough to be repainted.

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